



MOTOROLA

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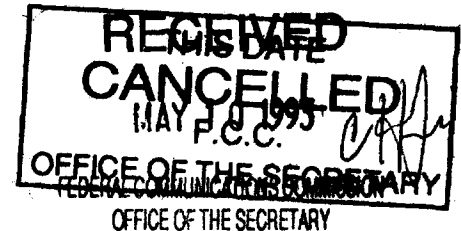
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MAY 10 1993

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

May 10, 1993



Ms. Donna Searcy
Secretary, Federal Communications Commission
1919 M Street, Room 222
Washington, D.C. 20554

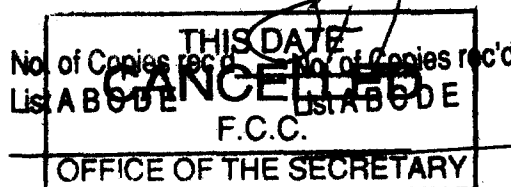
Dear Ms. Searcy:

Re: PR Docket No. 92-235

Attached is information used in an Ex Parte discussion with staff in the Office of Engineering and Technology concerning the above-captioned proceeding.

Regards,

Stuart E. Overby
Manager of Regulatory Programs
Government Relations



AGENDA

I. CURRENT ENVIRONMENT

II. REFARMING NPRM

II. PROJECT 25 ACTIVITY

III. TECHNOLOGY UPDATE

IV. FIELD MODIFICATIONS

MOTOROLA

CURRENT LAND MOBILE ENVIRONMENT BELOW 800 MHZ

12 MILLION RADIOS IN USE

IMBEDDED USER EQUIPMENT INVESTMENT OF \$25 BILLION

WIDE VARIATION IN USER REQUIREMENTS/SOLUTIONS:

COVERAGE AREA

FEATURES

GRADE OF SERVICE

COST

CUSTOMER CHOICE FROM COMPETITIVE SUPPLIERS

MULTIPLE SYSTEMS ON THE SAME CHANNEL IN THE SAME CITY

OVERLAPPING BANDWIDTH ON ADJACENT CHANNELS

Refarming Below 470 MHz
Private Land Mobile Spectrum

<u>Service</u>	<u>Channels</u>		
	<u>24 - 50 MHz</u>	<u>150 - 174 MHz</u>	<u>450 - 470 MHz*</u>
<u>Business</u>	36	26	155

FCC MIGRATION PROPOSAL PER NPRM

150-174 MHZ:

- ONLY 5 KHZ CHANNEL EQUIPMENT ALLOWED FOR AUTHORIZATIONS ISSUED AFTER R&O EFFECTIVE DATE (APPROX 1/94)
- EXISTING LICENSEES MUST REDUCE DEVIATION TO FIT 15 KHZ CHANNEL BY 1/1/96
- ALL LICENSEES MUST EMPLOY 5 KHZ EQUIPMENT BY 2004-2012, DEPENDING ON MARKET AREA
- 5 KHZ INNOVATOR CHANNELS INTERLEAVED WITHIN CURRENT SERVICE GROUPS; INNOVATOR LICENSES ISSUED PRIOR TO 2004

450-512 MHZ:

- ONLY 6.25 KHZ CHANNEL EQUIPMENT ALLOWED FOR AUTHORIZATIONS ISSUED AFTER R&O EFFECTIVE DATE (APPROX 1/94)
- EXISTING LICENSEES MUST REDUCE DEVIATION TO FIT 12.5 KHZ CHANNEL BY 1/1/96
- EFFECTIVE 1/1/96 BEGIN LICENSING OF NEW 6.25 KHZ CHANNELS. NEW CHANNEL CTRS. LOCATED 9.375 KHZ FROM CURRENT PRIMARY CHANNEL CTRS AND 3.125 KHZ FROM CURRENT OFFSET CHANNEL CTRS.
- ALL LICENSEES MUST EMPLOY 6.25 KHZ EQUIPMENT BY 2004-2012, DEPENDING ON MARKET AREA
- PERMIT LICENSEES TO REASSEMBLE CHANNELS FOR TECHNOLOGIES SUCH AS TDMA, WIDEBAND DATA; BASED ON BENCHMARK EFFICIENCY: 6.25 KHZ/4800 BPS PER "TALKER"

APCO-25 & FS-1102 DIGITAL STANDARDS

- **Joint Public Safety & Federal Gov.
committee**
- **Working since Q4 1989**
- **Significant interest worldwide:**
United kingdom, Neatherlands, France,
Belgium, Sweden, Norway, Denmark,
Australla, New Zealand, and Austria
- **Significant interest from other users:**
Railroads and Utilities

DIGITAL SYSTEM STANDARDS

- Motorola believes digital standards are required.**
- Both Users and Industry will benefit from stds.**
- Motorola has actively supported APCO-25 with:**
 - Concrete technical proposals**



APCO-25 INDUSTRIAL PARTICIPANTS T.I.A.

Aware Inc.

Bendix King Inc.

Cycomm Corp.

Digital Voice Systems Inc.

Ericsson/GE

E. F. Johnson Inc.

Glenayre Electronics

GTE, Inc.

MARKIS

GEC-Marconi, Ltd

Midland, LMR Inc.

Motorola Inc.

Racal Ltd

Raytheon Inc.

SEA Inc.

Stanilite Electronics Pty Ltd

Teletec, Inc.

HUGUES



APCO-25 / FS-1024 STANDARD CONSIDERATIONS

Key Issues and Requirements:

- Group calling and fast access
- High audio quality
- Range equal to current clear analog systems
- Integrated voice and data services
- Talk-around for non-infrastructure communication
- Compatibility with existing user capital investment
- Graceful "migration in place" with existing spectrum
- System flexibility for diverse user needs:
(Single site, ribbon systems, wide area, trunking, simulcast, etc.)
- Low density economics.
- Field unit portability, covert operation, & 8-hour life

APCO-25

Digital Standards Focus

Trunking

Encryption

**Common Air Interface
(Adopted 1/93)**

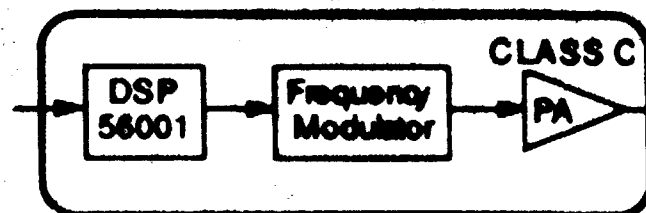
Data

**Over-the-Air Rekeying
OTAR**

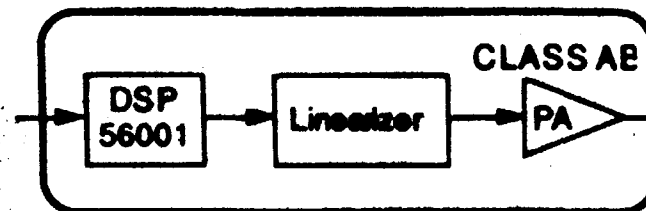
QPSK-C MODULATION FAMILY

TRANSMITTERS

4-LEVEL FM VERSION



LINEAR AM VERSION

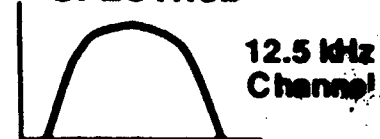


COMMON RECEIVER

CONSTANT
ENVELOPE



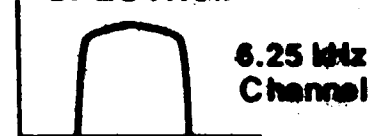
SPECTRUM



TIME



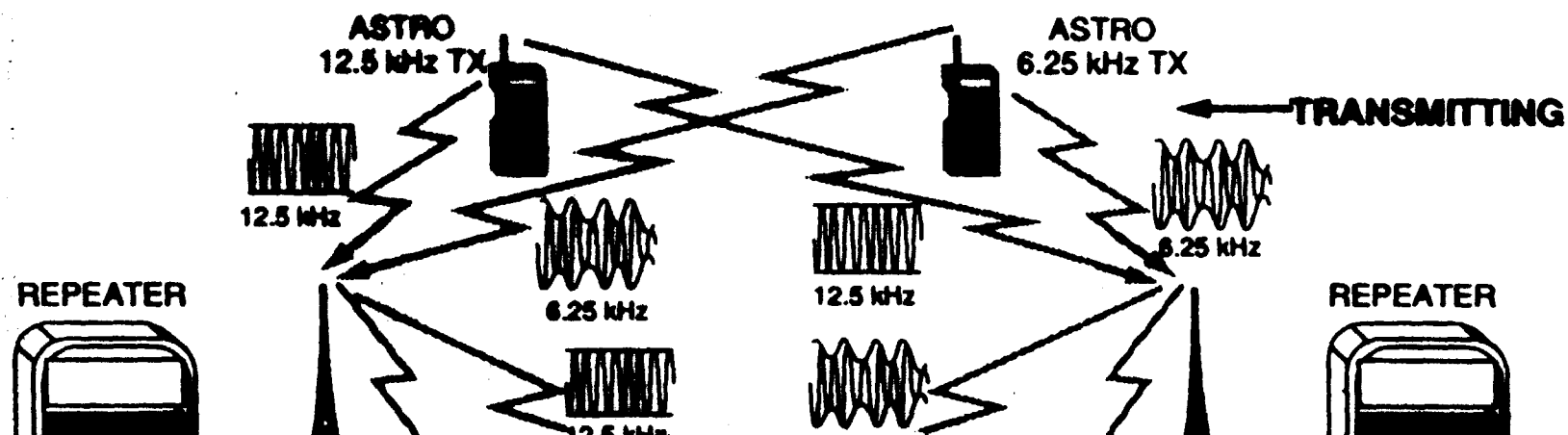
SPECTRUM





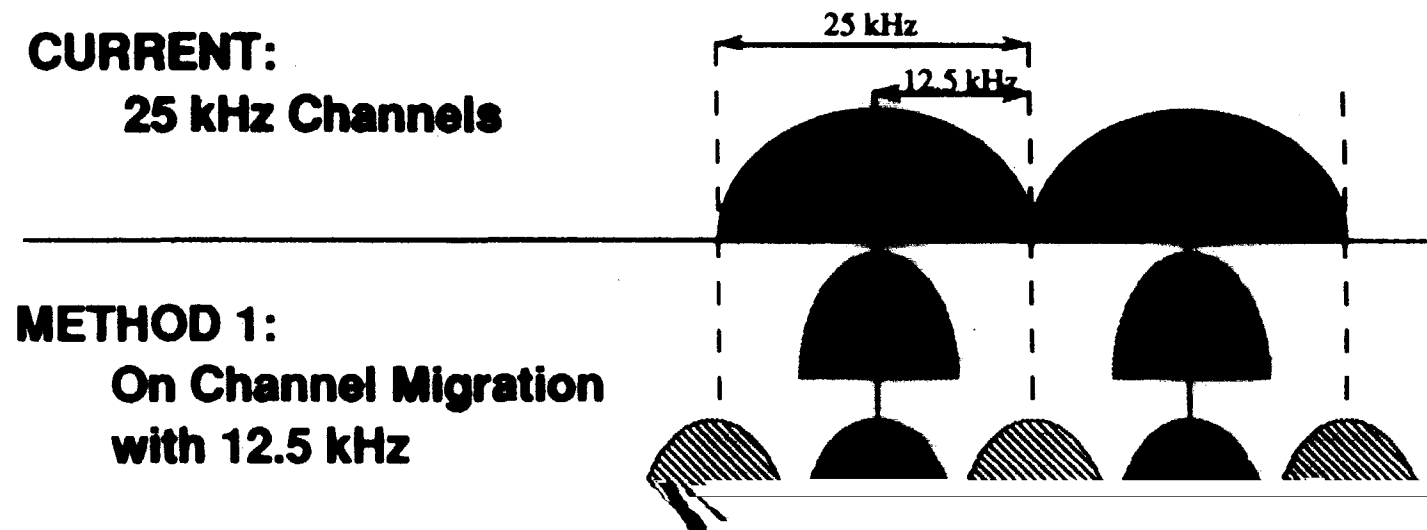
MOTOROLA, INC.

MIGRATION to NARROWER CHANNELS with QPSK-c MODULATION



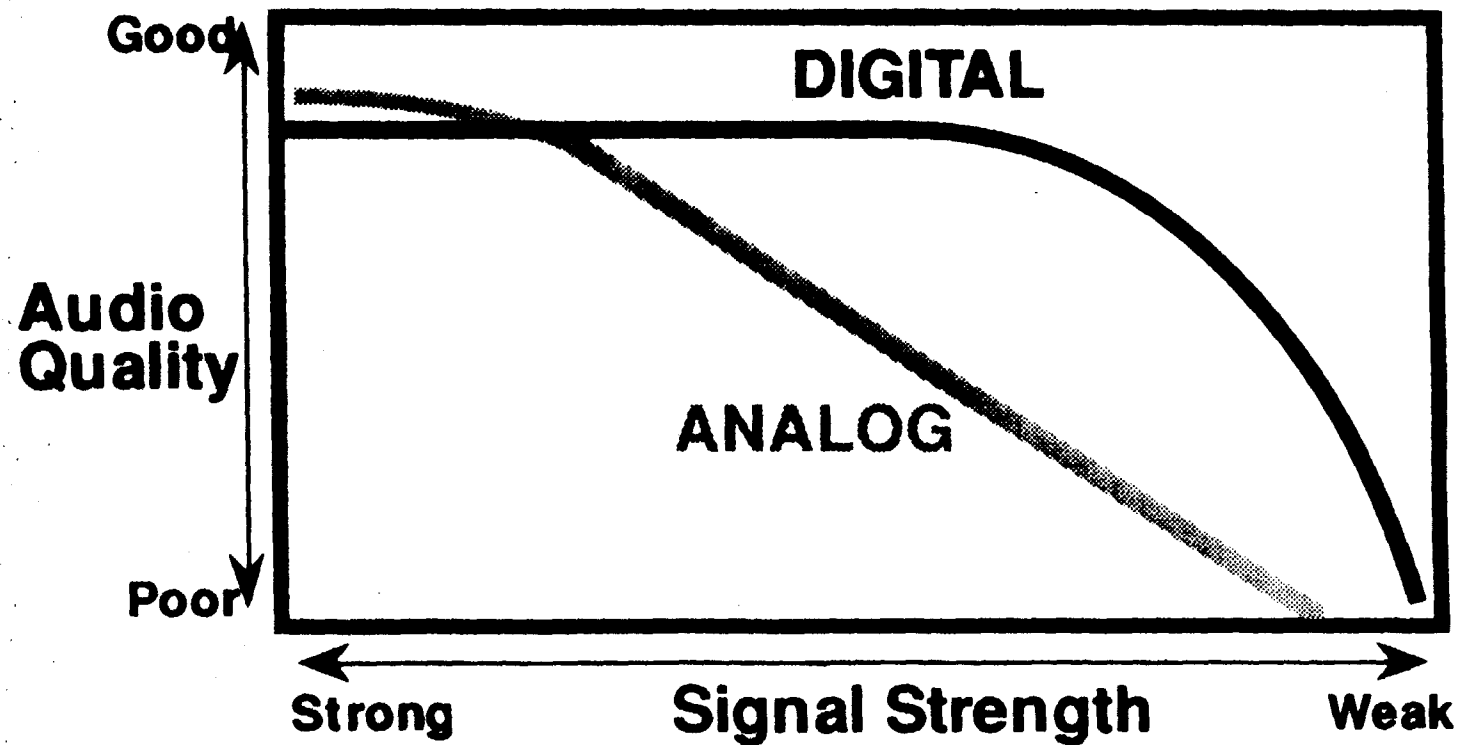
12.5 kHz MIGRATION ALTERNATIVES

CURRENT:
25 kHz Channels

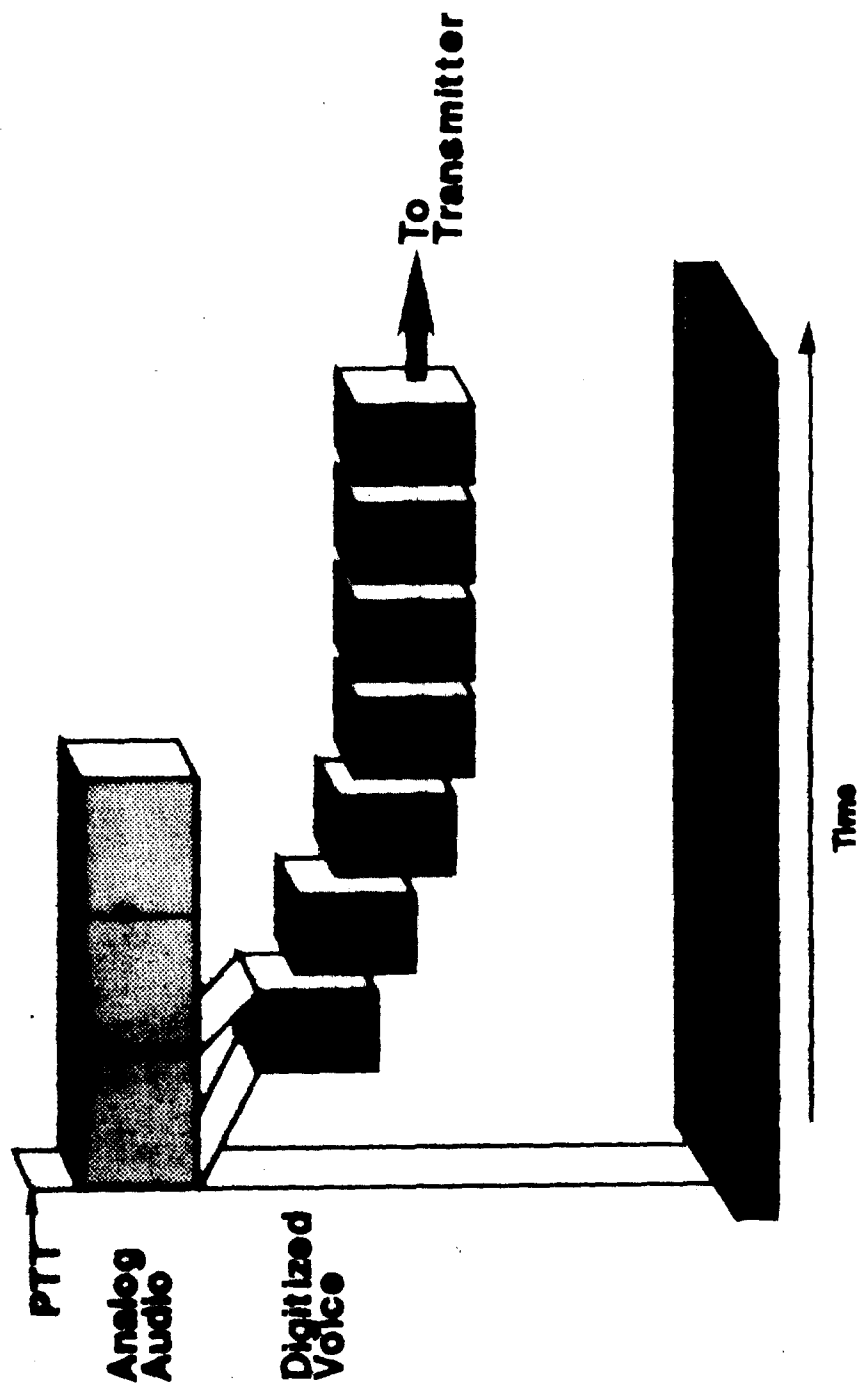


METHOD 1:
On Channel Migration
with 12.5 kHz

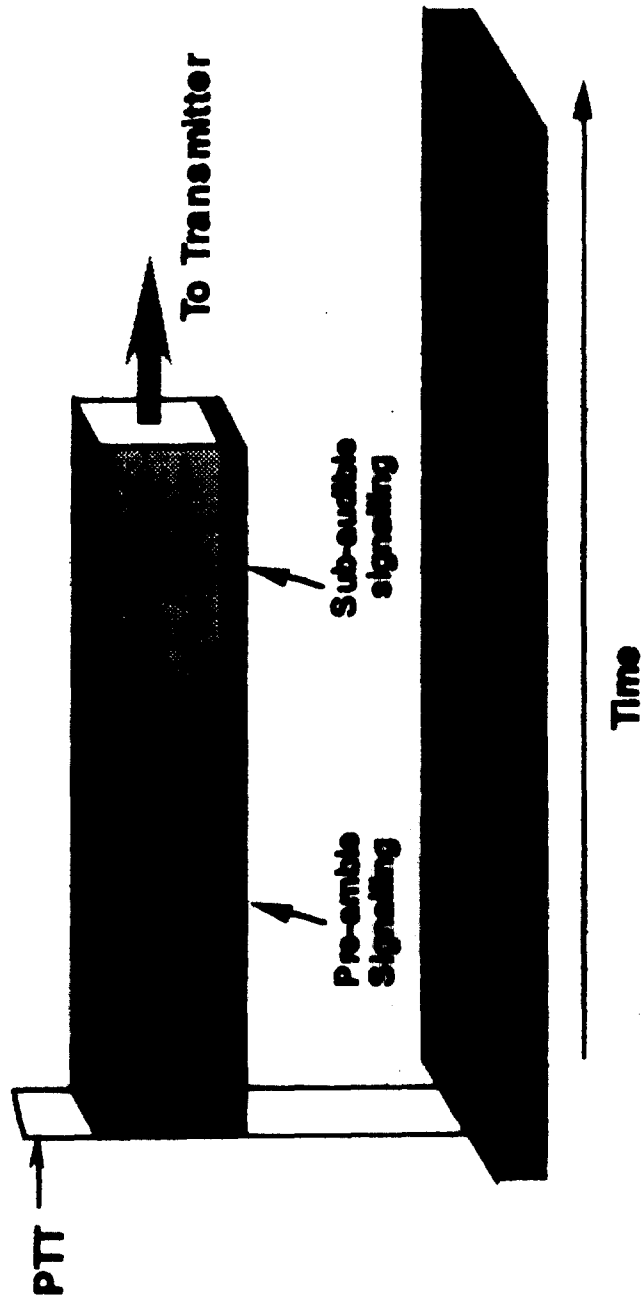
AUDIO QUALITY ^{vs} SIGNAL STRENGTH



DIGITIZED VOICE



ANALOG SIGNALLING



ALLING

To
Transmitter



ASTRO
DIGITAL SOLUTIONS

ASTRO MIGRATION FLEXIBILITY

- **Multiple Voice Modes:**

- Analog
- 12 kb/s CVSD (Securenet)
- ASTRO Digital

- **Multiple Systems:**

- Conventional
- SMARTNET Trunked
- SMARTZONE
- Stat-Alert

- **Multiple Bandwidth:**

- 12.5 kHz narrow band
- 25 / 30 kHz wide band